Also, in Appendix C, TIA provides its recommendations for frequency stability requirements under the proposed Part 88 of the Rules. The attached table includes standards for 25 kHz bandwidth equipment because under migration proposals that are currently before the FCC,[18] existing users will continue to purchase and use such equipment for an interim period. In this regard, the TIA proposal is consistent with the current standard for 25 kHz equipment that is contained in Section 90.213 of the FCC Rules.

TIA's recommended frequency stability requirements for 12.5 kHz equipment are based on the performance of equipment that has been operating for a number of years at 12.5 kHz in Europe and Asia in the same bands thus demonstrating that the frequency stabilities

and the receiver IF filter roll-off characteristics. This leaves 540 Hz for netting error with

user foregoing the benefits of mobile communications because it simply cannot afford the equipment. To do so would deprive the U.S. economy of the incredible efficiencies that come from sophisticated communications capabilities.

Respectfully Submitted,

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APPENDIX A

HEIGHT AND POWER RECOMMENDATIONS

VHF TABLE I
MAXIMUM ALLOWABLE ERP (watts)
(Provides 37 dbμ at service area contour
per R-6602 Fig. 19)

HAAT (ft)	2	5	8	10	15	20	25	30	40	50	60	63
50	1	32	200	500	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
100	---	8	50	126	631	(1)	(1)	(1)	(1)	(1)	(1)	(1)
150	---	3.5	22	56	302	1000	(1)	(1)	(1)	(1)	(1)	(1)
200	---	2	13	32	158	562	(1)	(1)	(1)	(1)	(1)	(1)
250	---	1.3	8	20	100	355	1000	(1)	(1)	(1)	(1)	(1)
300	---	1	5	13	80	250	700	(1)	(1)	(1)	(1)	(1)
350	---	---	4	10	54	178	500	(1)	(1)	(1)	(1)	(1)
400	---	---	3	8	45	140	400	1000	(1)	(1)	(1)	(1)
450	---	---	2.2	6	32	105	302	759	(1)	(1)	(1)	(1)
500	---	---	2	5	25	90	250	630	(1)	(1)	(1)	(1)
600	---	---	1.3	3.3	20	63	180	420	(1)	(1)	(1)	(1)
700	---	---	1	2.5	14	45	160	320	(1)	(1)	(1)	(1)
800	---	---	---	2	10	35	100	240	(1)	(1)	(1)	(1)
900	---	---	---	1.5	8	28	80	190	(1)	(1)	(1)	(1)
1000	---	---	---	1.2	6	22	63	160	1000	(1)	(1)	(1)
1750	---	---	---	---	1.6	4.5	13	32	191	1000	(1)	(1)
2000	---	---	---	---	1.2	3	8	20	125	631	(1)	(1)
3000	---	---	---	---	---	1.5	4	10	53	200	(1)	(1)
3400	---	---	---	---	---	1.4	3.5	8	45	250	1000	(1)
4000	---	---	---	---	---	1.3	3.2	7.5	35	166	800	(1)
5000	---	---	---	---	---	1.2	2.8	6.3	32	141	630	1000

Note (1): Max ERP of 1000 watts allowed. However, signal strength at the service area contour will be less than 37 dbμ.

VHF TABLE II
MINIMUM DISTANCE BETWEEN BASE STATIONS (mi)
(by service area range (mi))

Range	2	5	8	10	15	20	25	30	40	50	60	63
2	10	17	28	37	52	56	62	69	86	100	118	127
5	17	20	31	40	55	59	65	73	89	102	121	130
8	28	31	34	43	58	62	68	76	92	105	124	133
10	37	40	43	45	60	64	70	78	94	107	126	135
15	52	55	58	60	65	69	75	83	99	112	131	140
20	56	59	62	64	69	74	80	88	104	117	136	145
25	62	65	68	70	75	80	85	93	109	122	141	150
30	69	73	76	78	83	88	98	98	114	127	146	155
40	86	89	92	94	93	104	109	114	124	137	156	165
50	100	102	105	107	112	117	122	127	137	147	166	175
60	118	121	124	126	131	136	141	146	156	166	176	185
63	127	130	133	135	140	145	150	155	165	175	185	188

UHF TABLE I
MAXIMUM ALLOWABLE ERP (watts)
(Provides 39 dbμ at service area contour
per R-6602 Fig. 29)

HAAT (ft)	2	5	8	10	15	20	25	30	40	47
50	2.5	100	660	(1)	(1)	(1)	(1)	(1)	(1)	(1)
63	1.6	65	417	1000	(1)	(1)	(1)	(1)	(1)	(1)
100	---	26	166	400	(1)	(1)	(1)	(1)	(1)	(1)
150	---	12	76	178	1000	(1)	(1)	(1)	(1)	(1)
200	---	6.3	42	100	513	(1)	1000	(1)	(1)	(1)
275	---	3.5	22	50	282	1000	(1)	(1)	(1)	(1)
300	---	2.8	20	45	250	831	(1)	(1)	(1)	(1)
400	---	1.6	11	25	141	500	(1)	(1)	(1)	(1)
500	---	1	6.3	16	83	316	(1)	(1)	(1)	(1)
550	---	---	5.2	125	71	250	1000	(1)	(1)	(1)
600	---	---	5	11	63	208	890	(1)	(1)	(1)
700	---	---	3.5	8	50	158	631	(1)	(1)	(1)
800	---	---	2.7	6.3	38	120	500	(1)	(1)	(1)
900	---	---	2.2	5	30	95	380	(1)	(1)	(1)
1000	---	---	1.7	4	21	80	316	1000	(1)	(1)
2000	---	---	0.5	1.3	5	20	63	200	(1)	(1)
2600	---	---	---	---	3.2	12.6	45	123	1000	(1)
3000	---	---	---	---	3	10	38	96	740	(1)
4000	---	---	---	---	2.5	6.3	20	52	390	(1)
5000	---	---	---	---	1.6	5	14	35	250	1000

Note (1): Max ERP of 1000 watts allowed. However, signal strength at the service area contour will be less than 39 dbμ.

UHF TABLE II
MINIMUM DISTANCE BETWEEN BASE STATIONS (mi)
(by service area range (mi))

Range	2	5	8	10	15	20	25	30	40	47
2	10	17	27	34	42	50	60	69	96	112
5	17	20	30	37	45	53	63	73	99	115
8	27	30	33	40	48	56	66	76	102	118

APPENDIX B

TIA PROPOSED EMISSIONS MASKS

A. 12.5 kHz Mask

This 12.5 kHz mask is intended for:

- reduced deviation analog (*i.e.*, 2.5 kHz peak deviation with a splatter filter similar to that used for 896-901 MHz equipment), or
- advanced digital FDMA modulation using QPSK-c modulations as proposed for use within APCO Project 25 (using either the FM version, C4FM, or the partially linear version, CQPSK).

Based on actual equipment measurements and computer simulations, TIA has developed a proposal for the 12.5 kHz masks. The 12.5 kHz mask is as follows:

Displacement Frequency (f)	**Attenuation (Db)**
$0 < f \leq 2.5$ kHz	0
2.5 kHz $< f \leq$ 12.5 kHz	7(f-2.5)
12.5 kHz $< f$	50 + 10 log(P) or 70 dB, whichever is the lesser attenuation

This mask has been designed to use a spectrum analyzer with the following settings:

- Resolution Bandwidth (BW) = 300 Hz. (This choice of bandwidth is critical because it has been chosen to equalize the spectrum of tones, which is relatively fixed as the analyzer bandwidth changes, to that of the noise-like advance digital or other digital signals which will move up as BW is increased and down as BW is decreased).
- Video Bandwidth $\geq$ 3000 Hz
- Span = 50 kHz for 12.5 kHz channels
- For noise-like or digital signals, peak hold should be utilized with at least 10 sweeps.
- A sweep speed which allows the analyzer to remain calibrated should be used.

With the center frequency of the analyzer set to the assigned transmitter frequency, the transmitter should be keyed with an unmodulated carrier, and the level adjusted to the full scale reference line. This is the 0 dB reference for the measurement. For analog modulation, modulate the transmitter with a 2.5 kHz overdriven tone (with the level set 16 dB higher than that required to achieve 1.25 kHz deviation, 50% of rated system deviation). For digital modulation it is assumed that the vocoder technique will cause the modulated signal to be essentially random so that no special input need be applied.

For digital voice modulation, the FCC spectrum designator when using C4FM is 8K1F1E. The first 3 characters show that this emission has a 99% power bandwidth (occupied bandwidth) of 8.1 kHz. The 4th character stands for frequency modulation. The 5th character describes the nature of the signal as being modulation of the main carrier. And the 6th and last character signifies that it is a telephony or voice transmission.

B. 6.25 kHz Mask

This mask has been developed in support of APCO Project 25. While Project 25 is concerned only with digital modulation, the emission masks described are intended for both analog and digital modulation. Because FM modulation cannot be supported in 6.25 kHz channels, this proposed masks allows either Single Side Band (SSB) modulation for the analog case or can be used with the proposed digital modulation for APCO Project 25 using the compatible CQPSK modulation method. The plan is to allow voluntary migration to 6.25 kHz channels using this mask.

Displacement Frequency (f)	**Attenuation (Db)**
$0 < f \leq 3$ kHz	0
3 kHz $< f \leq$ 4.6 kHz	30 + 16.67(f-3.0) or 55 + 10 log(P) or 65 dB, whichever is the lesser attenuation
4.6 kHz $< f$	55 + 10 log(P) or 65 dB, whichever is the lesser attenuation

The mask has been designed to use a spectrum analyzer with the following settings:

- Resolution Bandwidth (BW) = 100 Hz
- Video Bandwidth $\geq$ 100 Hz
- For noise-like or digital signals, peak hold should be utilized with at least 10 sweeps.

- A sweep speed which allows the analyzer to remain calibrated should be used.

The new TIA technique of using a very wide IF setting should be used to set the reference level at 0 dB. For the analog case, the transmitter should be modulated with the input signal specified by pervious rules for the 200 MHz band. For digital modulation it is assumed that the vocoder technique will cause the modulated signal to be essentially random so that no special input need be applied.

The above mask is based on the 220 MHz mask already developed for SSB modulation and the proposed FCC masks for 6.25 kHz channels. The only thing that has been done is to extend the authorized bandwidth from 5 kHz to 6 kHz. This was necessary because the bandwidth of the 9600 bps CQPSK signal is ideally 5.76 kHz. The extension of this to 6 kHz was done to accommodate the resolution bandwidth of the spectrum analyzer.

APPENDIX C

FREQUENCY STABILITY

I. FIXED AND BASE STATIONS (PARTS PER MILLION)

FREQUENCY BAND	25 kHz	12.5 kHz	6.25 kHz
150 - 222 MHz	5.0	2.5	1.0
450 - 512 MHz	2.5	2.0[1]	0.1

II. MOBILE STATIONS (PARTS PER MILLION)

FREQUENCY BAND	25 kHz	12.5 kHz	6.25 kHz
150 - 222 MHz	5.0[2]	5.0	1.0
450 - 512 MHz	5.0	2.5	0.5

[1] Beginning January 1, 1996, fixed and base stations must have a frequency stability of 1.5 ppm.

[2] Mobile stations operating at 2 watts or less power output may operate at a frequency stability of 50 ppm.